

# **Spot Safety Project Evaluation**

Project Log # 200611073

Spot Safety Project # 07-01-009

**Spot Safety Project Evaluation of the Guardrail Installation  
On SR 1104 - Dairyland Road at Morgan Creek  
Orange County**

Documents Prepared By:

Safety Evaluation Group  
Traffic Safety Systems Management Section  
Traffic Engineering and Safety Systems Branch  
North Carolina Department of Transportation

**Principal Investigator**

\_\_\_\_\_  
Jason B. Schronce

Traffic Safety Project Engineer

2/8/2007  
Date

# ***Spot Safety Project Evaluation Documentation***

## **Subject Location**

Evaluation of Spot Safety Project Number 07-01-009 – On SR 1104 - Dairyland Road at Morgan Creek, Orange County.

## **Project Information and Background from the Project File Folder**

The spot safety project improvement countermeasure chosen for the subject location was the installation of guardrails in the vicinity of and at the culvert over Morgan Creek. A member of the NC House of Representatives originally requested improvements after a fatal accident occurred at the location. SR 1104-Dairyland Road is a heavily traveled rural two-lane facility with a speed limit of 45 mph. This roadway section is located in a densely wooded and residential area.

The initial crash analysis for this location was completed from January 1, 1998 through December 31, 2000 with a total of five reported crashes. According to the initial analysis, there was one fatal Ran-off Roadway accident that was deemed correctable by the proposed improvements. The countermeasure was installed to reduce the severity of the Ran-off Roadway crashes. The final completion date for the improvement at the subject intersection was on June 30, 2002 at a total cost of \$65,000.00.

## **Naïve Before and After Analysis**

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from May 1, 2002 through August 31, 2002. The before period consisted of reported crashes from May 1, 1998 through April 30, 2002 (4 Years) and the after period consisted of reported crashes from September 1, 2002 through August 31, 2006 (4 Years). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes on the 0.243 mile strip of SR 1104- Bethel-Hickory Church Road / Dairyland Road from 150 feet south of SR 1259 (MP 1.338) to 500 feet east of culvert #283 at Morgan Creek (MP 1.095). This strip also includes SR 1113 from 150 feet west of Rollingwood Road to 500 feet east of Morgan Creek (MP 4.971 to 5.264). A 0 feet Y-line was used in the analysis. Please see attached *Location Map* for further detail.

The following data Table 1 depicts the Naive Before and After Analysis for the Total Crashes and Target Crashes at the treatment location. Table 2 provides an in depth examination of the Naïve Before and After Analysis for the Target Crashes. Please note that Target Crashes include the following crash types: Ran Off Road - Right, Ran Off Road - Left, Ran Off Road - Straight, Overturn/Rollover, and Fixed Object.

Table 1. Treatment Information

	Before Period	After Period	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	8	8	0.00 %
Total Severity Index	20.875	1.925	- 90.78 %
Total Target Crashes	2	4	100.00 %
Target Severity Index	38.900	1.00	- 97.43 %
Volume	4100	4400	7.32 %

Table 2. Target Crash Information

	Before Period	After Period	Percent Reduction (-)/ Percent Increase (+)
<i>Target Crashes</i>			
Fatal Injuries	1	0	- 100.00 %
Non-Fatal Injuries	0	0	N/A
Total Injuries	1	0	- 100.00 %
<i>Target Crashes</i>			
Night Crashes	0	1	100.00 %
Wet Crashes	0	1	100.00 %
Alcohol/ Drug Crashes	0	0	N/A
Guardrail Struck	N/A	2	N/A

The naive before and after analysis at the treatment location resulted in no reduction of Total Crashes, a 91 percent decrease in the Total Severity Index, and a 7.3 percent increase in Average Daily Traffic (ADT). There was also a 100 percent increase in Target Crashes and a 97.4 percent decrease in the Severity Index for Target Crashes. The before period ADT year was 2000 and the after period ADT year was 2005.

## Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in no reduction of Total Crashes and a 100 percent increase in Target Crashes. The summary results above demonstrate that the treatment location appears to have had an increase in Target Crashes from the before to the after period.

As previously stated, the guardrail was installed to reduce the severity of the Ran-off Roadway crashes and to prevent motorists from entering Morgan Creek. One fatal injury crash occurred in the before period as a result of the motorist running off the road, down the embankment, and entering the water. In the after period, the guardrail prevented any vehicles from entering the water and was effective in protecting motorists from the steep vertical drop-off after leaving the roadway. Therefore, there was a 97.4 percent decrease in the Target Severity from the before to the after period.

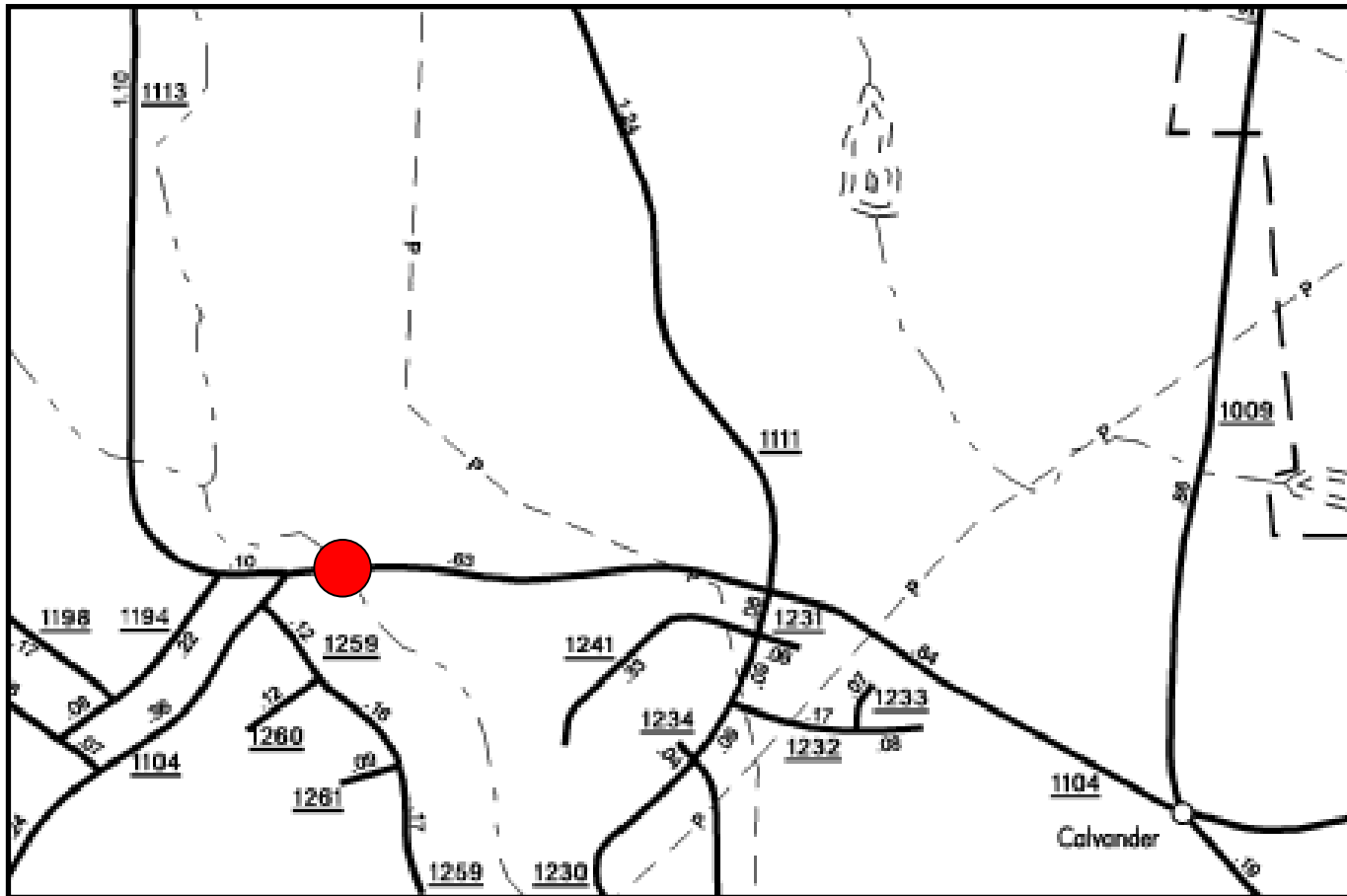
Although the project did prevent motorists from entering the creek, it did not prevent them from leaving the roadway. In the before period, there were two (2) Ran-off Road Crashes. In the after period, there were four (4) Ran-off Road Crashes. The same crash pattern persists because no improvements were made to the roadway from the before to the after period.

The severity of crashes were greatly reduced from the before to the after period. In fact, the Severity Index for Target Crashes decreased by 97.4 percent at the treatment location. Even though, the number of Target Crashes did increase at this location, the project's objectives were met by examining that only property damage target crashes occurred in the after period.

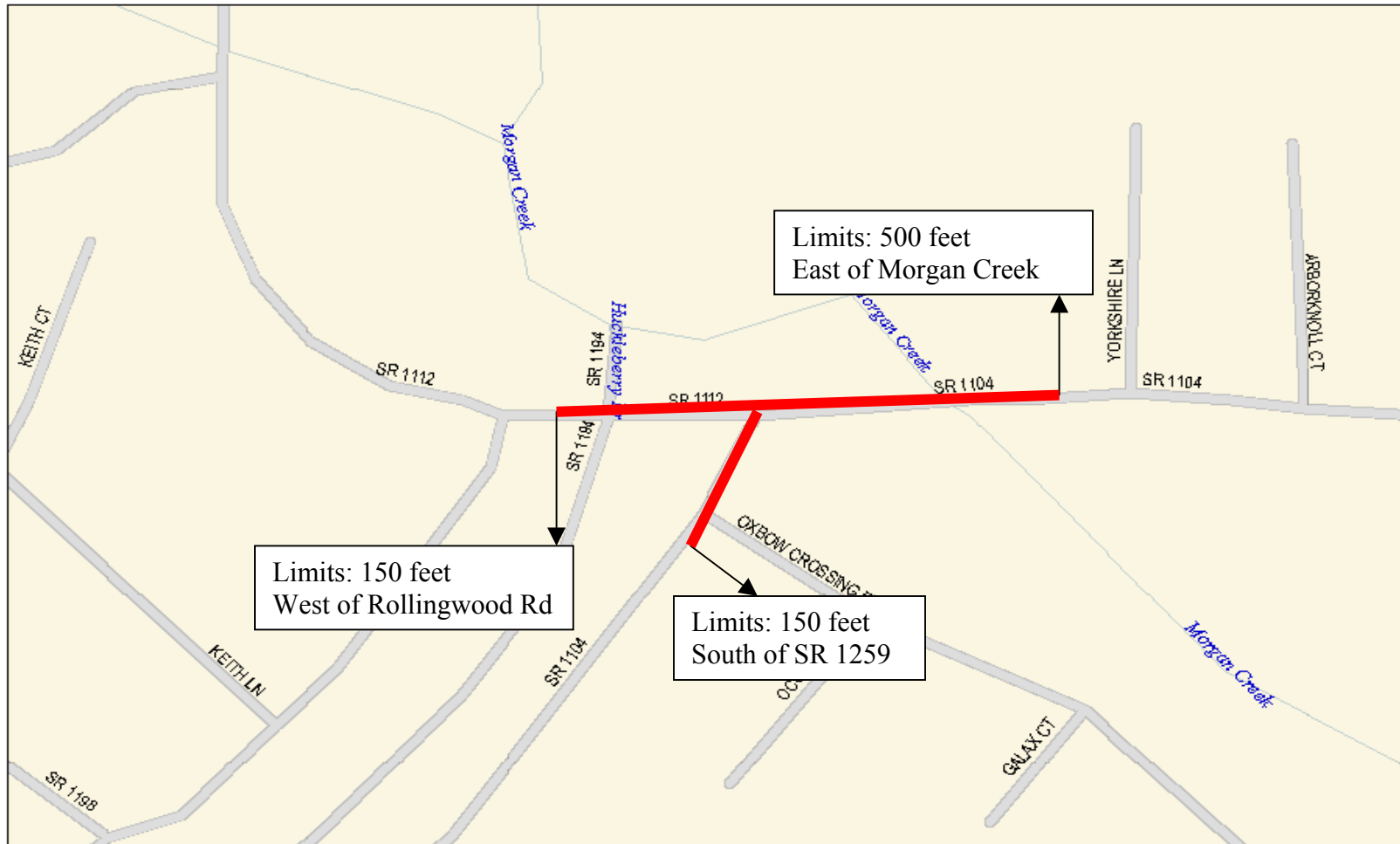
Please see the attached *Treatment Site Photos*. Photos are provided for all three approaches to the subject location including photos of Morgan Creek and the culvert that carries it under SR 1104.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for guardrail placement.

**Location Map**  
**Orange County**  
**Evaluation of Spot Safety Project # 07-01-009**



**Treatment Location: SR 1104 (Dairyland Road) bridge over Morgan Creek  
near Chapel Hill, NC.**



*Treatment Site Photos (Taken on December 19, 2006)*



Driving west on SR 1104- Dairyland Road



Guardrail over Morgan Creek – Facing East





View of Morgan Creek – Facing East



Intersection guardrail of Dairyland and Bethel-Hickory Church – Facing Southwest





Guardrail from Bethel-Hickory Church Rd to Rollingwood Road – Facing West





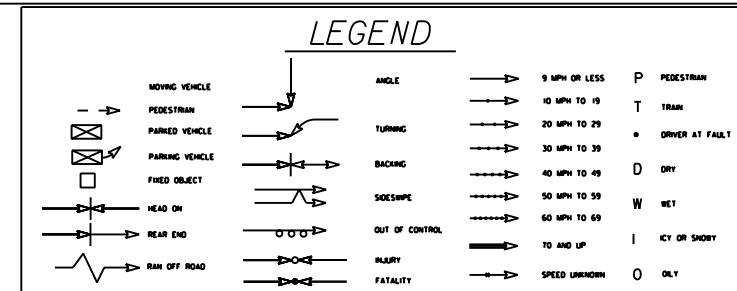
LOOKING SOUTH



LOOKING NORTH

View of Morgan Creek and the Box Culvert that carries it under SR 1104 / Dairyland Road

SS# 07-01-009  
 ORANGE County  
 BEFORE PERIOD  
 5/1/98 - 4/30/02  
 SR 1104 over Morgan Creek



SR 1113 / Dairyland

45 MPH

SR 1104 /  
 Dairyland

45 MPH

Rollingwood  
 Road

Bethel - Hickory  
 Church Rd  
 SR 1104 / Old NC 54  
 55 MPH

SR 1259

Morgan  
 Creek

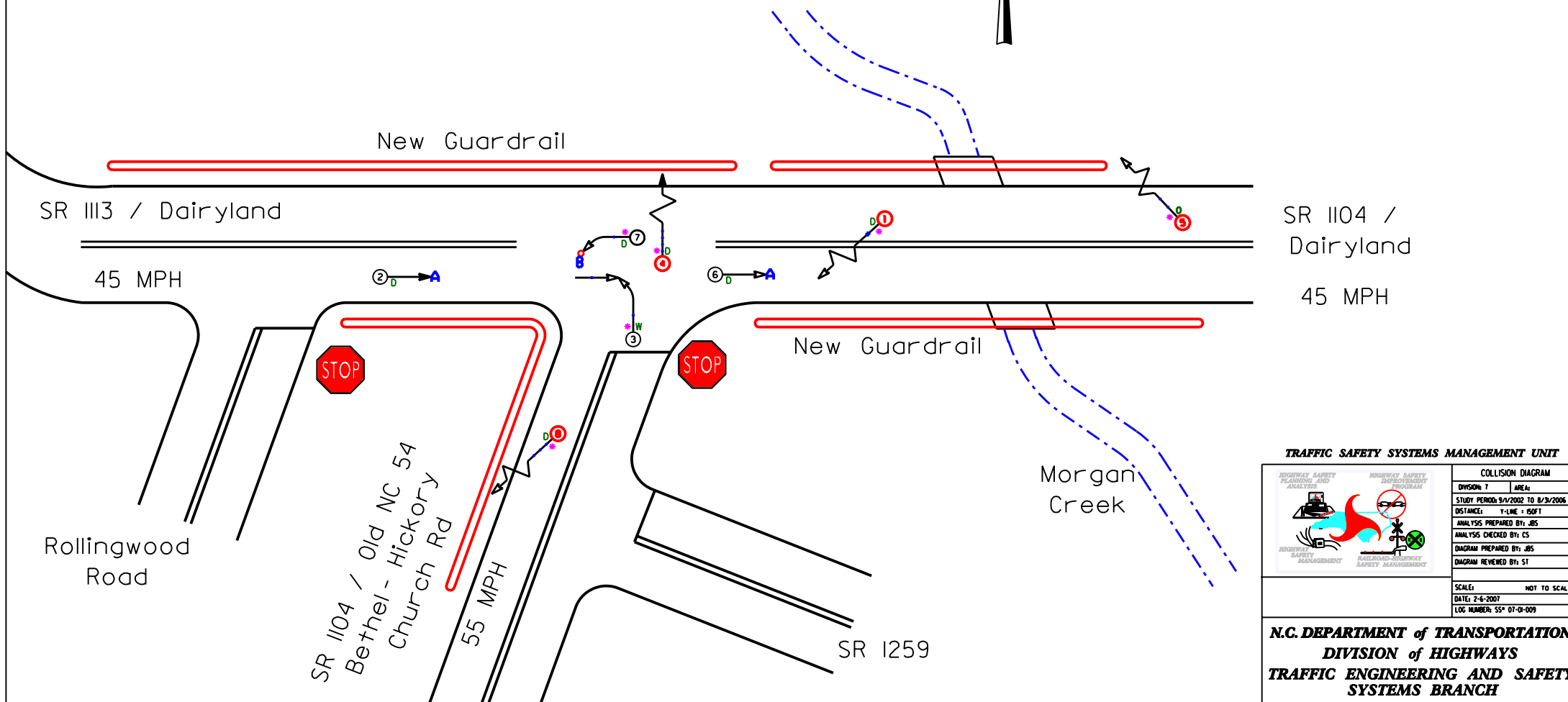
**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**

COLLISION DIAGRAM	
DIVISION: 7	AREA:
STUDY PERIOD: 5/1/98 TO 4/30/2002	
DISTANCE: 1-MILE = 50FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: CS	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE:	NOT TO SCALE
DATE: 2-6-2007	
LOG NUMBER: SS* 07-01-009	

**N.C. DEPARTMENT of TRANSPORTATION**  
**DIVISION of HIGHWAYS**  
**TRAFFIC ENGINEERING AND SAFETY**  
**SYSTEMS BRANCH**

# SS# 07-01-009 ORANGE County AFTER PERIOD 9/1/02 - 8/31/06 SR 1104 over Morgan Creek

LEGEND			
	MOVING VEHICLE		ANGLE
	PEDESTRIAN		TURNING
	PAIRED VEHICLE		BACKING
	PARKING VEHICLE		SIDESWIPE
	FIXED OBJECT		OUT OF CONTROL
	HEAD ON		INJURY
	REAR END		FATALITY
	RAN OFF ROAD		9 MPH OR LESS
			10 MPH TO 19
			20 MPH TO 29
			30 MPH TO 39
			40 MPH TO 49
			50 MPH TO 59
			60 MPH TO 69
			70 AND UP
			SPEED UNKNOWN
			P PEDESTRIAN
			T TRAIN
			* DRIVER AT FAULT
			D DRY
			W WET
			I ICY OR SNOWY
			O ONLY



**TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT**

COLLISION DIAGRAM	
DIVISION: 7	AREA:
STUDY PERIOD: 9/1/2002 TO 8/31/2006	
DISTANCE: 1/4 MILE - 1/2 MILE	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: CS	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 2-6-2007	
LOG NUMBER: SS# 07-01-009	

**N.C. DEPARTMENT of TRANSPORTATION**  
**DIVISION of HIGHWAYS**  
**TRAFFIC ENGINEERING AND SAFETY**  
**SYSTEMS BRANCH**